EPC 4.0 Fast-forwarded: Quickly Adapting to the Current Economic Scenario

To put it simply, adopting EPC 4.0 starts with creating an integrated data-centric system to keep all the components of EPCM i.e. Engineering, Procurement, Construction, and Management in one location. In this article, Waldir Pimentel Junior, narrates the context, rationale, and the possibilities of EPC 4.0 adoption for the EPC companies.

The current pandemic, combined with the unprecedented fall in oil prices this year, has pressed the world's fast-forward button, especially when it comes to how the EPC (Engineering, Procurement, & Construction) companies will adapt to this new world order. The current EPC market is forced to rebalance the economic situation by accelerating internal projects; and in consequence, speed up the decisions from years to just months – switching to working-from-home is one such example of expeditious changes.

In pre-COVID-19 period, the EPC processes of industrial plants and other businesses have not been changed much in the past years. Recent plants are technically not much different from those which were built many years ago. This made the EPC industry to slow down in driving innovation, which was otherwise ahead in implementing the engineering / IT systems. This causes the industry to lose in the global competition for investments.

While ideating for some EPC customers, it is not unusual to hear them saying that they do not feel any real productivity increase has been achieved over the past 20 years. Although efficiency improvement is being talked about in this space for quite a while, in many a cases the EPC companies have still been struggling to close their projects even with a minimum profit or just making the ends meet to survive.

The reasons why this happens vary a lot depending on the nature of the project, the industry being served to, as well as the project location across the globe. Nevertheless, some similarities have become evident based on my discussions and observations with clients across the world:

- Technology is not being used by the EPC companies up to the fullest extent of their existing capacity. Imagine a company that uses only piping modeling instead of the full capability of their tools to model other disciplines (such as electrical, steel structures, etc.) of the 3D modeling system.
- Old technologies and software versions are being used by the Owner Operators (OOs) as they are obligated to do so according to contractual terms, which unfortunately does not act as an incentive.
- Many a cases technologies don't deliver what was promised.
- Lack of integration: EPC companies are still using their tools in silos in an inefficient and non-streamlined way without exchanging the data amongst them.

"Adapt Quickly or Die" – this is the challenge that the EPC industry is now facing more than ever, or at least more than in the last half-century. All of a sudden, adoption of EPC 4.0 (Industry 4.0) has become a mandate and is not optional anymore.

To keep everybody on the same page, let's define what we mean by EPC 4.0. This means creating an integrated data-centric system that keeps all E-P- C and even EPC *"M"* (EPC + Management) information in one place. It supports not only the design, but also the information management, change management, data reuse, and a proper digital handover to the OOs. EPC 4.0 includes the entire lifecycle of the plant and is a real change from a kind of hybrid model i.e. "paper + digital" to a full data-centric digital model.

Let's consider an example. As a global leader in sensor, software, and autonomous solutions, Hexagon has established partnerships with AspenTech and OSIsoft, which in the near future will allow Aspen tools to move data - automatically - from the conceptual and basic engineering to the detailed phase, and consequently to all the other EPC phases. During operations, the solutions will remain integrated to ensure that the

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Modern web-based access to engineering data any time, any place on any device.

potential changes in process simulation are within the constraints of the design model, for example, flow rates as defined by the P&ID. In addition, populating the Manufacturing Master Data Model as well as visualizing advanced predictive and prescriptive analytics put everything in an easy and organized way to the engineers in the operation room.

We all know that the EPC industry needs to expedite the changes in the current scenario. What can we learn from the other industries that have successfully embraced the Industry 4.0 concepts? Let's take a look:

Benefit from Your Engineering Systems

- Get the full benefit of your engineering systems and don't just produce some intelligent P&IDs;
- Rather use all available engineering tools and model all disciplines in a 3D environment.

This way, there are no silos with simple input /output as everything is integrated and all the data so generated can be reused and checked efficiently.

In addition, it is recommended not to reuse only the data that being exchanged between the disciplines, but also to reuse the previously created designs that exchanged between projects. It's not likely for exactly same two EPC projects to exist, but much of the content created in a project can for sure be reused in other projects without reinventing the wheel, thus saving a lot of time and money.

You can also perform automated cross-checks of the data generated by the tools, thus avoiding the wasting of time in verifying each of the deliverable-s (list, drawing, report, etc.) before any handover. The data-centric model saves a lot of time on final-verifications. It is also recommended not to perform any adjustments in deliverables outside the data-centric system, for example, by using simple CAD tools or MS Excel.

If you are not using your EPC tools to their fullest potential, you certainly regard them as a burden, thus incurring extra cost. In this case, you might start to move back to earlier stages of digital transformation, going to perform the drawings in simple CAD tools, reports in spreadsheets, etc literally returning 20 years in time.

Improve engineering collaboration

As projects are becoming more complex and require global collaboration amongst the EPC companies located across continents and time zones, there's also a need for improved coordination amongst the offices and across the disciplines more than ever before. Do you have tools and processes that can support global engineering? To know the answer, you only need to answer a few questions:

1. Do you have the best-streamlined process design available with you? Or do you keep using xls, txt, cvs, xml files to exchange data; and simple CAD tools to produce deliverables?
2. How are you dealing with procurement and construction phases? Do you have a modern design tool but a spreadsheet control for your procurement? And is your documentation still inside that shared folder in the server where everybody has access?

EPC Companies vary in size and type, ranging from companies only focusing on the engineering side to others solely focusing on procurement and construction. No matter the size or type, if you don't have all the necessary steps aligned, both internally and externally, you will be losing efficiency; and in this specific market at the current scenario, this can make a big difference.

Enhance project delivery

Are you still just delivering PDFs to your customers? If so, there is a better way. For most of the Owners Operators, importance of digital transformation and Industry 4.0 concept remained untouched even some years ago. Especially after the crisis occurred in 2014 – 2015, the interest in a Digital Twin implementation has risen quickly as the Owners understood that this brings in not only the efficiency but also the cost savings.

To perform efficiently during such a transformation, OOs are adopting standards such as CFIHOS, which define the data in detail, which is equired to be handed over from projects to operations to carry out all the necessary procedures for data-centric deliverables. Such alignment by OOs has been gaining a lot of momentum, and now due to the current scenario that we face, it will certainly

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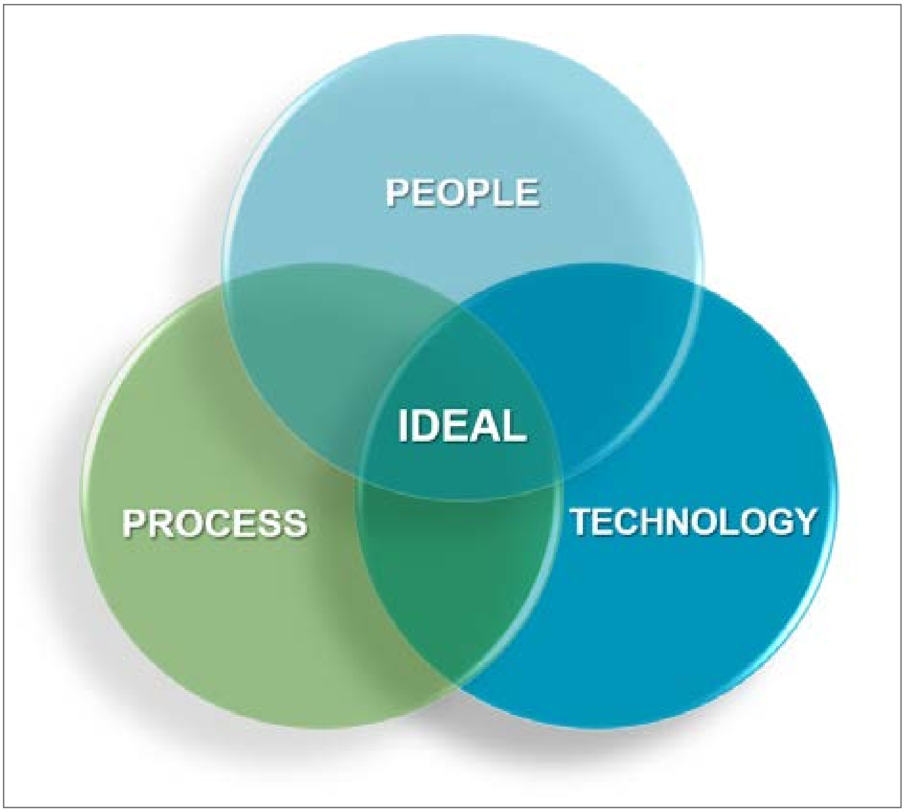

become even more important.

And now, more than ever, Owner Operators will look for companies mutually aligned with their requirements, putting aside the ones that cannot understand or work in their industry 4.0 world.

What to consider when adopting EPC 4.0 technologies?

Always look for a balance between the people, processes, and technologies when considering any system implementation.

That is because it is impossible to have tools & technologies that make all the professionals happy and that fit in to all the processes of a company. Though in-house development of such tools & technologies is possible, starting a tech company inside an EPC would seem a waste, as this brings a lot of extra costs unrelated to the EPC business. Rather than reinventing the wheel by yourself, you can rely on trust-worthy vendors.

Have you considered how you can make use of your engineering digital twin to enhance your offering to your Owner Operator customers and extend your footprint? Owner Operators do not necessarily have the resources or skill sets to maintain the digital twin; so why not to offer to do this on their behalf and manage the engineering digital twin into the operational phase? Many engineering companies have started to move down this path to increase revenues and to leverage their skills into the operational phase where there is a more stable revenue flow.

As per a recent study conducted by McKinsey[1], the oil and gas industry will continue to be affected by the COVID-19 situation and will lower the processes for the immediate future. It is worth noticing that the industry has been performing only slightly better than air and travel business, and frankly nobody can predict how the world economic recovery will be. In this way, it is better to remain prepared for serving other markets and having the right partners to support you on this.

Look for different markets

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In Conclusion:

Finally, as a golden rule for a successful EPC 4.0 implementation, my recommendation would be: do not try to go from Zero to Hero. As discussed earlier, EPC companies vary on size, specialization, and tech maturity level. Start solving first the issues that you have on your stronger side, even if this requires you to detach from the whole EPC offering. You may consider the start by focusing only on the engineering design or procurement management or construction, or even sub-areas of those main ones. As long as you're getting stronger in all areas – in other words – more profitable, you will be able to provide the whole portfolio of services again.

As you may have noticed, I did not mention here anything about IoT, disruptive technologies, or super-advanced AI to reach EPC 4.0. All the ideas discussed here have been around for some time and are still very powerful and feasible for implementation. I am confident that you can quickly organize all the ideas and prepare yourself as well as your company for this digital journey. And there is no better time than the present to get started.

References :

1] McKinsey: the Restart Report, May 2020. ■

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